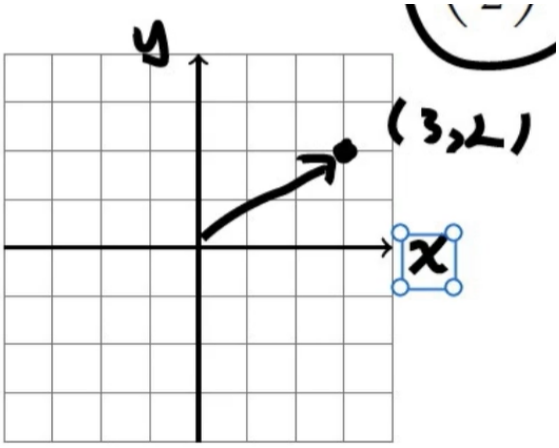
Vectors in R

$\mathbb{R}$ denotes the collection of all real numbers.

$\mathbb{R}^1 = \mathbb{R}$ is a number line
$\mathbb{R}^2$ is a plain
$\mathbb{R}^3$ is a 3-D space.

Vectors

Point $(3, 2)$ can be represented as the vector $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$



Vectors properties:

$$\vec{u} = \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}, \quad \vec{v} = \begin{pmatrix} v_1 \\ v_2 \end{pmatrix}.$$

Vectors have the following properties.

1. **Scalar Multiples**: $c\vec{u} = c\begin{pmatrix} u_1 \\ u_2 \end{pmatrix} = \begin{pmatrix} cu_1 \\ cu_2 \end{pmatrix}$

2. **Vector Addition**: $\vec{u} + \vec{v} = \begin{pmatrix} u_1 \\ u_1 \end{pmatrix} + \begin{pmatrix} v_1 \\ v_2 \end{pmatrix} = \begin{pmatrix} u_1 + v_2 \\ u_1 + v_2 \end{pmatrix}$